

AMENDMENTS TO THE CLAIMS

This listing of the claims replaces all prior versions, and listings, of the claims in this application:

LISTING OF THE CLAIMS

1. **(Currently Amended)** A permanent magnetic core device for use as a transformer, inductor, choke, or a component in a current limiting circuit, ~~CHARACTERIZED BY~~ comprising:

first and second layers of magnetic conductive material ~~(2)~~ retained in a predetermined, spaced apart relationship with respect to one another, so as to define opposed facing surfaces, at least at first and second end portions thereof, and a gap between said layers;

a first permanent magnetic piece ~~(3)~~ located at said first end portion between said first and second layers of ferromagnetic material, and a second permanent magnetic piece ~~(3)~~ located at a second end portion between said first and second layers of magnetic conductive material, the first and second permanent magnetic pieces being placed so that their fields are additive;

magnetic pole pieces positioned between the first and second layers of the magnetic conductive material and the respective first and second permanent magnet pieces, and;

coil means surrounding each of said first and second layers of magnetic conductive material, said coil means extending within said gap between said first and second permanent magnetic pieces and being placed so that fields produced by the coil means are additive.

2. **(Original)** The permanent magnetic core device as claimed in claim 1, wherein said coil means comprises one or more coils.

3. **(Original)** The permanent magnetic core device as claimed in claim 2, wherein each of said one or more coils are wrapped around said respective first and second layers of core material.

4. **(Cancelled)**

5. **(Currently Amended)** A toroidal permanent magnetic core for use as a transformer, choke or component in a current limiting circuit, ~~CHARACTERIZED BY~~ comprising:

a first semi-circular toroidal ferromagnetic piece ~~(6)~~ having first and second ends;

a second semi-circular toroidal ferromagnetic piece (6) having first and second ends;

said first and second ends of said first toroidal ferromagnetic piece being arranged to face the first and second ends of said second toroidal ferromagnetic piece, such that the ends of said first and second toroidal ferromagnetic pieces are opposed and spaced apart;

permanent magnetic means ~~(7)~~ magnets interposed between said ends of said toroidal ferromagnetic pieces and joined with said toroidal ferromagnetic pieces;

at least one pole piece attached to a periphery of said first and second toroidal ferromagnetic pieces; and

a coil ~~(9)~~ surrounding a portion of said first toroidal ferromagnetic piece or said second toroidal ferromagnetic piece, said first and second toroidal ferromagnetic pieces and said permanent magnetic pieces defining a closed toroidal structure.

6. **(Currently Amended)** The toroidal permanent magnetic core as claimed in claim 5, wherein said permanent magnetic means (7) comprises two spaced-apart permanent magnets.

7. **(Currently Amended)** The toroidal permanent magnetic core as claimed in claim 6, wherein said spaced-apart permanent magnets (7) are arranged along a single plane.

8. **(Currently Amended)** ~~The toroidal permanent magnetic core as claimed in claim 6, wherein said spaced apart permanent magnets (7) are arranged along parallel planes, and angled with respect to a diametric plane of said toroidal permanent magnetic core.~~ A toroidal permanent magnetic core for use as a transformer, choke or component in a current limiting circuit, comprising:

a first semi-circular toroidal ferromagnetic piece having first and second ends;

a second semi-circular toroidal ferromagnetic piece having first and second ends;

said first and second ends of said first toroidal ferromagnetic piece being arranged to face the first and second ends of said second toroidal ferromagnetic piece, such that the ends of said first and second toroidal ferromagnetic pieces are opposed and spaced apart;

permanent magnets interposed between said ends of said toroidal ferromagnetic pieces and joined with said toroidal ferromagnetic pieces;

said permanent magnets being arranged along parallel planes, and angled with respect to a diametric plane of said toroidal permanent magnetic core;

at least one pole piece attached to a periphery of said first and second toroidal ferromagnetic pieces; and

a coil surrounding a portion of said first toroidal ferromagnetic piece or said second toroidal ferromagnetic piece, said first and second toroidal ferromagnetic pieces and said permanent magnetic pieces defining a closed toroidal structure.

9. (Cancelled)

10. (Cancelled)

11. (Currently Amended) The toroidal permanent magnetic core as claimed in claim 5, further including a plurality of pole pieces (8) attached to a periphery of said first and second toroidal ferromagnetic pieces (6).

12. (Currently Amended) The toroidal permanent magnetic core as claimed in claim 11, wherein said toroidal permanent magnetic core includes an inner periphery and an outer periphery and said plurality of pole pieces are attached to said ~~internal~~ inner periphery and said outer periphery.

13. (Currently Amended) The toroidal permanent magnetic core as claimed in claim 5, wherein said toroidal permanent magnetic core includes an inner and outer periphery and said coil (9) is wrapped around portions of said inner and outer peripheries.

14. (Currently Amended) A multi-phase electrical device for use as a power distribution transformer, a power distribution protection device or a current limiting device, ~~CHARACTERIZED BY~~ comprising:

a first core structure ~~(21)~~ and a second core structure ~~(24)~~, each of said first core structure and second core structure having a perimeter and at least one vertical limb extending within said perimeter of each core structure;

said first and second core structures being retained in juxtaposition by permanent magnet sets ~~(19, 20)~~ interposed between said first and second core structures, said permanent magnet sets respectively comprising permanent magnet pieces with magnetic pole pieces positioned between the permanent magnet pieces and the first and second core structures; and

coils ~~(18, 22, 23)~~ surrounding at least a portion of said perimeter, and surrounding at least a portion of said at least one vertical limb;

wherein said first and second ~~frames~~ core structures and permanent magnet sets form a unit.

15. **(Currently Amended)** The multi-phase electrical device as claimed in claim 14, wherein said magnet sets ~~(19, 20)~~ are sandwiched between said first and second core structures ~~(21, 24)~~.

16. **(Currently Amended)** The multi-phase electrical device as claimed in claim 14, wherein said magnet sets ~~(19, 20)~~ comprise a plurality of permanent magnet assemblies positioned adjacent said perimeter.

17. **(Original)** The multi-phase electrical device as claimed in claim 16, wherein each magnet assembly is arranged to have an opposite polarity to other adjacent magnet assemblies.

18. **(Cancelled)**

19. **(Currently Amended)** The multi-phase electrical device as claimed in claim 14, wherein a first magnetic field established by the coils ~~(18, 22, 23)~~ is orthogonal to a second field established by the permanent magnet sets ~~(19, 20)~~, whereby energy losses and hysteresis losses in said multi-phase electrical device are reduced.

20. **(Currently Amended)** The multi-phase electrical device as claimed in claim 19, wherein vectored fluxes produced by said orthogonally arranged coils ~~(18, 22, 23)~~ produce a net flux density that exceeds a predetermined saturation flux density of the permanent magnet sets ~~(19, 20)~~.